1958
1967

SOUTH SASKATCHEWAN RIVER PROJECT

1. St. Mary Dam.
2. Waterton Dam.
3. Bow River Irrigation Project.
4. Southwest Saskatchewan Irrigation Projects.
5. Gardiner Dam.
6. Qu'Appelle River Dam.
7. Indian Head Tree Nursery.
8. Shellmouth Dam.
9. Assiniboine River Dyking Project.
10. Rivers Dam.
11. Pasquia Reclamation Project.
12. Penticton Project.

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THE PROJECT IN REVIEW

On Friday, July 25, 1958, the Government of Canada signed an agreement previously approved by the Government of Saskatchewan authorizing the commencement of construction on the South Saskatchewan River Project, a large-scale multi-purpose water conservation project proposed for development in south-central Saskatchewan.

The purpose of this Project was to make better use of the water resources in the river through irrigation, power, river control, urban water supply and recreation.

Control of the South Saskatchewan River was to be achieved by two dams, the major one on the river itself at a point approximately half way between the towns of Outlook and Elbow, the other at the divide between the valleys of the South Saskatchewan and the Qu'Appelle Rivers.

The agreement provided that Canada and Saskatchewan would share the cost of building these structures and all other works associated with the creation of the reservoir, 75% to be borne by Canada and 25% by Saskatchewan, with the latter's share of costs not to exceed $25 million. The contribution of the Government of Canada was in accord with its long-range resources development plan to provide for expansion and stability in Canada's growing economy.

The Province of Saskatchewan would be responsible for developing the facilities to utilize the waters available from this great engineering undertaking.

The main dam, blocking the South Saskatchewan River, was named the Gardiner Dam in 1966, after the late The Right Honourable James G. Gardiner, long-time proponent of the project and former Federal Minister of Agriculture. The great man-made reservoir is called Diefenbaker Lake, in honour of The Right Honourable John G. Diefenbaker who, as Prime Minister of Canada, approved construction of the project in 1958. The secondary dam—the Qu'Appelle—takes its name from the valley it spans.

In 1967, construction of the impounding works and reservoir was completed and, as part of Canada's Centennial celebrations, this mighty project was dedicated to the service of man.

A WESTERN SAGA

river that flows swiftly

Long before the coming of the white man, the Indians used the South Saskatchewan River as their prairie highway. They called it Kisiskatchewan—swift flowing—and so it must have seemed to them as they launched their frail birch bark canoes upon its wide waters.

The sources of the South Saskatchewan are the vast glacial remnants of the last ice age that covered the North American continent. Swift-flowing mountain streams course together to form the six main tributaries of the South Saskatchewan River: the Waterton, Old Man, Belly, St. Mary, Bow and Red Deer Rivers.

East of the City of Prince Albert the South Saskatchewan joins the North Saskatchewan. The two streams together form the Saskatchewan River flowing into Lake Winnipeg, which eventually empties its waters into Hudson's Bay.

man and the river

Where, actually, does the history of the South Saskatchewan begin?

For centuries man has used the broad, brown waters of this river as a highway for canoes, flat-bottomed York boats, and, finally, sternwheeler steamers. With the coming of the railroad in 1885 these water craft became obsolete as a means of commercial transportation.

It is speculated that Henry Kelsey of the Hudson's Bay Company was the first white man to have stood on the Saskatchewan's high banks, to have marvelled at the vastness of the land about him and to have seen the majesty of the river below. This was in 1691, when the fur trade was still in its infancy, and the violent competition that was to follow had yet to appear.

It was not until 1749 that serious attempts to discover the sources of the two branches of the Saskatchewan system were made, when Louis-Joseph LaVerendrye, proud offspring of a distinguished French family, reached the forks of the two-pronged river system. Considering the rigors of the journey, and the dangers of the unknown, such probings then required the bravery, discipline and dedication that today is associated with the pioneers of space.

IN THE BEGINNING . . .

. . . God said be fruitful and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth on the earth.

Genesis 2:28

. . . replenish the earth, and subdue it . . . .

Man has ever responded to challenge, and nature has prompted him to his boldest ventures.

Soil, barrier between man and starvation, cannot of itself produce and nurture humanity. Water, essential for the sustenance and well-being of all plants and animals, must be employed in concert with the soil.

Engineers and scientists are in accord with poets who see the world in a drop of water. All have reached the same conclusion, merely expressing their convictions in different idioms.

Following is a story of challenge and conquest in man's age-old struggle for mastery over water, the essence of life.

It was left to Anthony Henday to finally reach, five years later, the western prairies and view the panorama of the Rocky Mountains—the source of the river that flows swiftly.

In the years that followed, the history of the Saskatchewan rivers was marked with violence and bloodshed as rival companies battled for supremacy in the fur trade. This ended with the amalgamation of the Hudson's Bay Company and the Northwest Company in 1821 and was preliminary to the settlement of the country brought about by the coming of the railroads in the latter part of the nineteenth century.

vision of a project

In 1857 the British Government sent an expedition under Captain Palliser to explore western Canada. The next year, the Government of Canada commissioned Professor H. Y. Hind to explore particularly the Assiniboine and Saskatchewan River valleys. Both noted the close interrelationship between the valley of the South Saskatchewan and the Qu'Appelle Lake and River system. Palliser suggested the feasibility of a navigable route connecting the two valleys; Hind thought a dam should be built across the South Saskatchewan to direct its waters down the Qu'Appelle Valley. But, with the Canadian Pacific completing its transcontinental railway, the concept of a water route to the west faded.

An erupting cloud from the South Saskatchewan River thunders the official start of construction on The Gardiner Dam on May 27, 1959.

urban area expansion

Sixty years ago when Regina and Moose Jaw were fast-growing centers, they, along with several smaller communities, experienced serious water shortages. Again, a dam across the South Saskatchewan was considered. Subsequent representations to the Canadian Government to direct water from the South Saskatchewan River to augment their meagre water supply were heard. However, the proposed project was considered to be too costly.

This situation continued until 1954. At that time, the Prairie Farm Rehabilitation Administration, popularly known as PFRA, was authorized to construct works for pumping water from the South Saskatchewan River into the Qu'Appelle Valley. This fed Buffalo Pound Lake, which is used as a water supply source for the two cities.

drought and disaster

The precarious situation of the farmer was generally recognized by governments and farm organizations for many years. It was not until the 1930's, however, when the prairies experienced their most severe and prolonged drought since the beginning of settlement, that the seriousness of the situation became fully apparent. This problem was compounded by the world-wide economic depression.

In 1935, the Government of Canada established the Prairie Farm Rehabilitation Administration, to find ways and means of overcoming drought on the prairie and to alleviate the depressed conditions that prevailed. Originally, activities of PFRA were primarily concerned with the conservation of land and water resources. The development of large-scale irrigation and reclamation projects is an important aspect of this program.

Surveyors stake out the South Saskatchewan River landscape for The Gardiner Dam.

In 1943, the organization began a study to determine the feasibility of constructing a large dam on the South Saskatchewan River. The need then was primarily a source of water for irrigation works, and farm and urban water supply. Ten sites along 100 miles of this river were investigated before the present location was chosen as being the most practicable.

In 1947, PFRA filed a report indicating a choice of site, an estimate of the cost, and descriptions of the benefits that could be derived from the project.

TIME FOR ACTION

With the signing of the 1958 agreement between the Governments of Canada and Saskatchewan, the initial contracts on the South Saskatchewan River Project were awarded in the fall of that year.

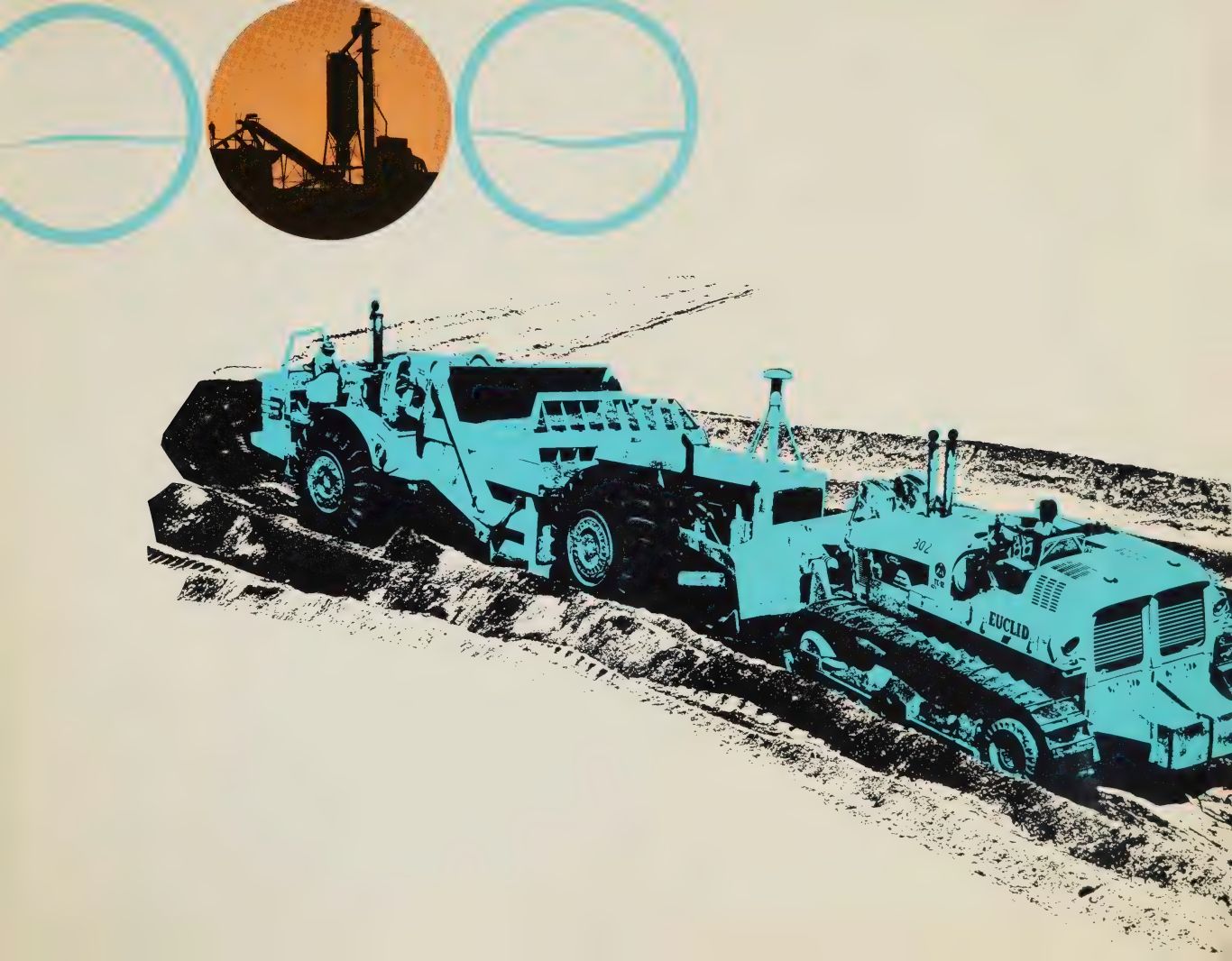
The first works undertaken were the construction of an access road, river piers for a construction bridge, and buildings and services for the townsite to house the PFRA personnel who were to supervise the project construction.

Early in 1959, work started on the main dam. This, the first stage of embankment construction, provided for the excavation of approximately 8,700,000 cubic yards of material and the placing and compacting of about 5,300,000 cubic yards of embankment on the east side of the river.

Late 1959 saw the start of the second stage of embankment construction. This construction, similar to the first stage but much more extensive, was located on the west side of the river. Work under this contract included the reduction of the river channel to half its original width.

Two other major contracts were awarded during the first full year of construction. These were the supply and erection of the construction bridge superstructure and the supply of steel ring beams to be used to support the river diversion tunnels during their construction.

Work on the diversion tunnels, perhaps the most interesting and difficult phase of construction of the Gardiner Dam, began in 1960. Costing $35 million, the combined length of the five tunnels is in excess of four miles.


EUCLID

Tunnel construction brought one of the more unusual pieces of equipment to be seen at the dam site. This was a mechanical mining machine known as the Mole. Equipped with a rotary cutting head, the electrically powered machine bored a hole 25 feet in diameter, scooping up its cuttings and passing them to the rear where they were hauled from the tunnel in railway mine cars.

As the Mole moved ahead, steel ring beams were installed around the circumference of the tunnel at 40-inch intervals immediately behind the head of this machine.

As tunnelling continued, construction began on high level intake shafts at the upstream end of the tunnels. As the reservoir filled, water would be taken in through these shafts at a point about 70 feet above the bottom of the reservoir and fed into the diversion tunnels below.

Work also proceeded on the installation of control gates which could be raised or lowered to regulate the flow of water passing through the tunnels. The superstructures containing hoists and other equipment for operating the gates appear as five cone-shaped houses on top of the dam and make it possible to recognize the site from many miles away.

It took over three years to complete the tunnels including the 30-inch thick concrete lining which reduced the inside tunnel diameter to 20 feet. In addition, steel liners, or penstocks, were installed in the downstream portion of the three tunnels, the latter being used to supply water for hydroelectric power production.

While work progressed steadily underground, a thousand men worked overhead night and day operating a wide variety of heavy earth-moving equipment. By the end of 1960, the first stage of embankment construction was completed and the construction bridge was in use. In 1961, tenders were awarded for work valued at close to $27 million. As a result of the magnitude of these contracts, 1962 proved to be a major construction year on this project.

In 1963, work commenced on the Qu'Appelle River Dam about 25 miles southeast of the main structure. Although much smaller than Gardiner Dam, it is 90 feet high, 10,100 feet long, and considered in the large dam class. It prevents water escaping from the reservoir. However, a concrete conduit built into the dam makes possible the release of water downstream for use in the Qu'Appelle Valley, and for consumption by the cities of Regina and Moose Jaw.

1963 also saw the beginning of construction on the concrete spillway structure of the Gardiner Dam and the work which required diverting the river flow through the tunnels. Under this contract portions of the dam were raised to their full height.

In 1964 the river was diverted through the tunnels, and the final stage of the embankment was started. This required the excavation of 33,500,000 cubic yards of material, the compaction of 28,100,000 cubic yards of embankment and the supply and placing of 639,000 tons of rock to protect the face of the dam. The cost of this work was more than $16.7 million, the largest single contract of the project.

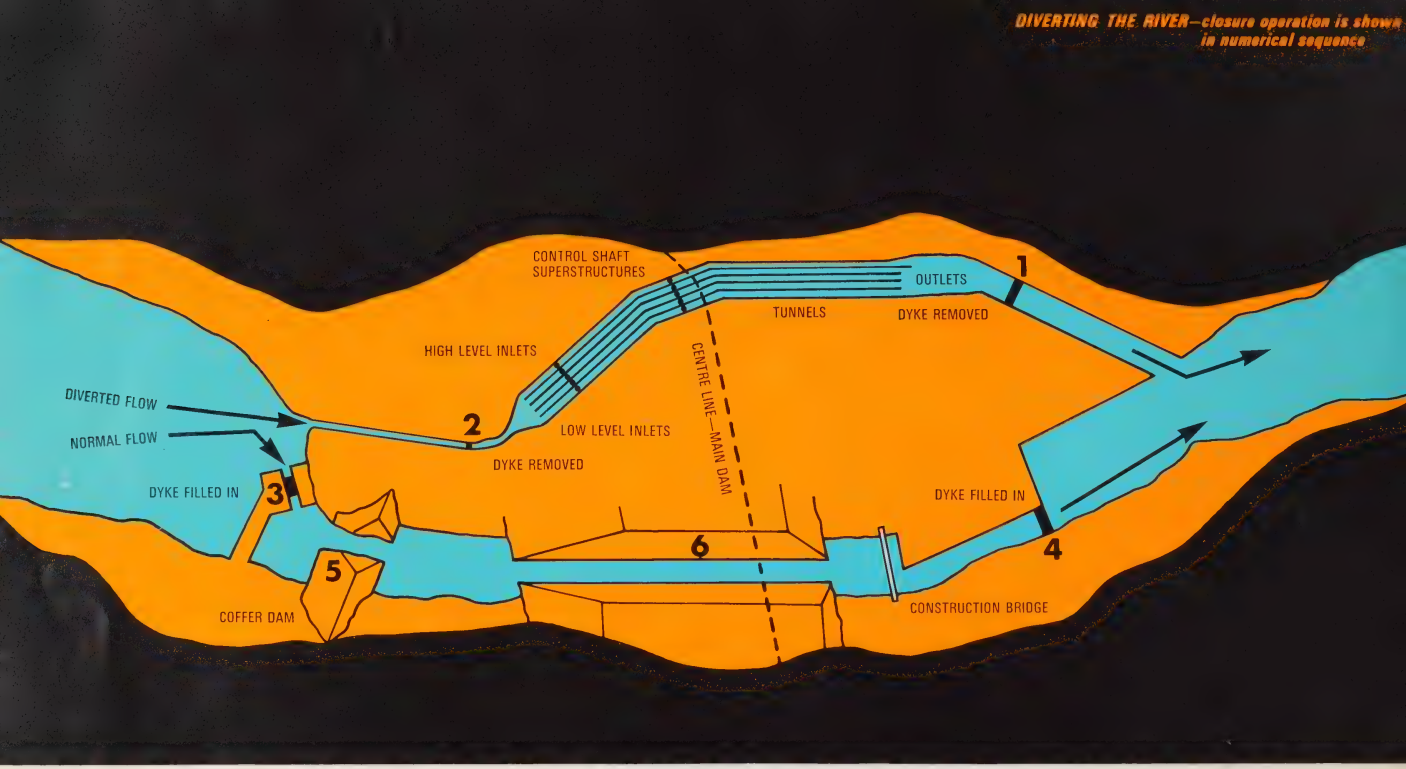
The creation of the large reservoir required major revisions to the railways and highways serving the area. Work on this aspect of the project proceeded in the period 1960 to 1965. One bridge crossing had to be rebuilt and a combination highway and railway bridge was abandoned and removed.

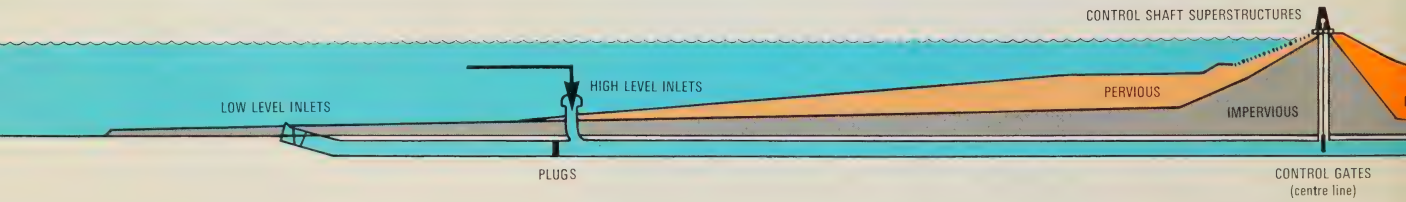
Early in 1965, the last major work was undertaken. This provided for the completion of the spillway, a mammoth job requiring 340,000 cubic yards of concrete to provide a structure having a discharge capacity of 265,000 cubic feet of water per second.

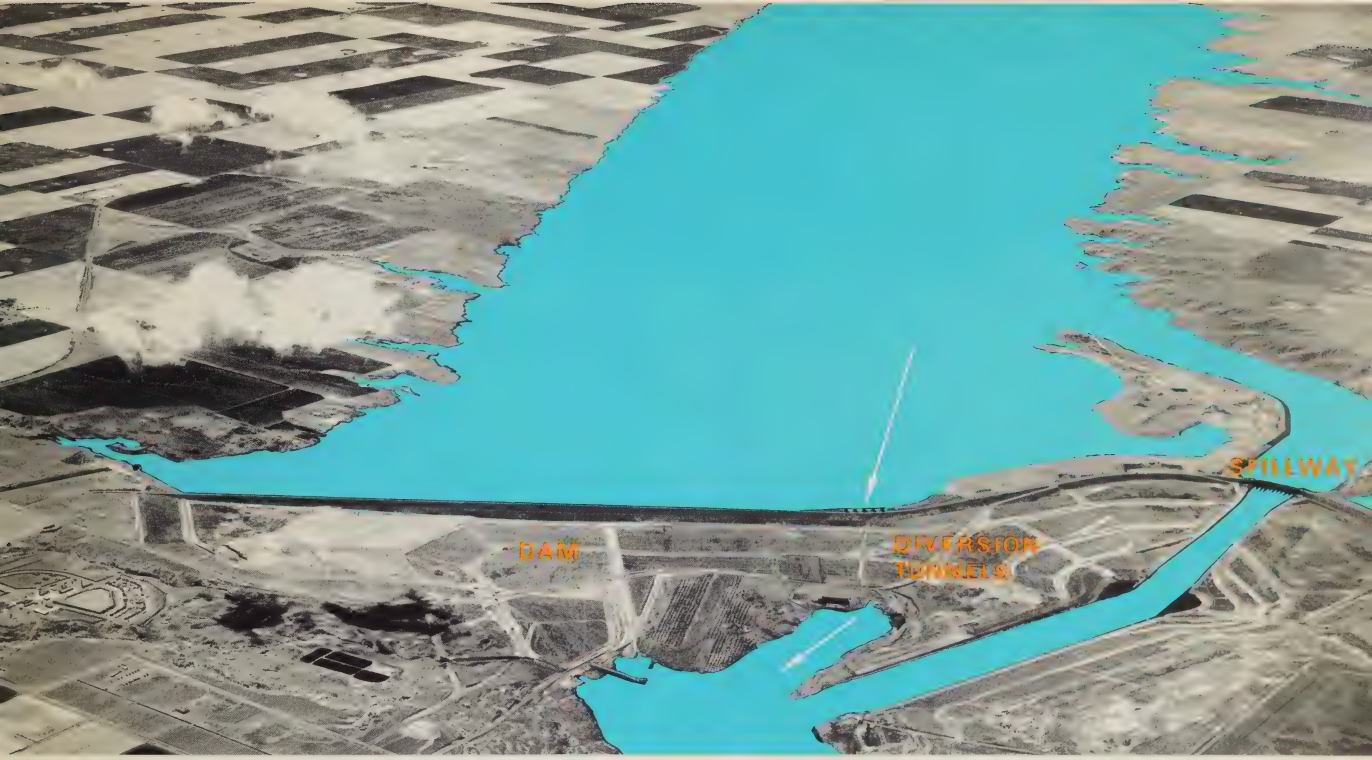
In 1967, construction of the impounding dams and reservoir was completed.

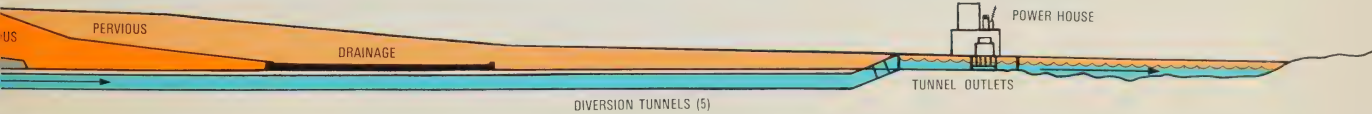
Clouds of prairie sand billow behind a speeding earth mover.

DIVERTING THE RIVER—closure operation is shown in numerical sequence

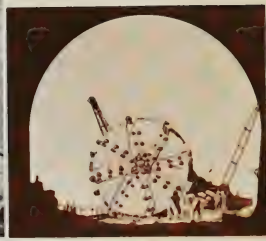


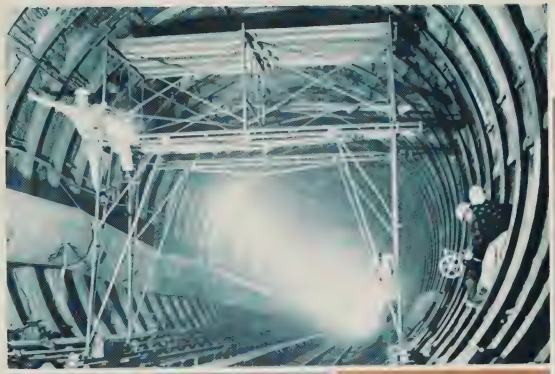


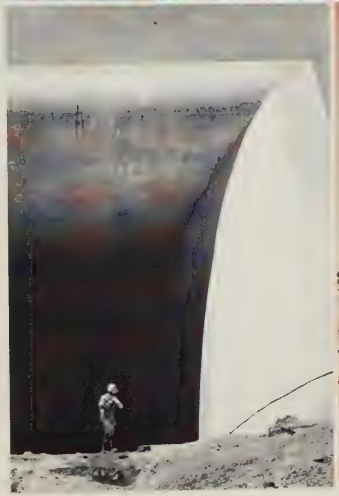




***PROFILE OF THE DAM**—showing earth construction, diversion tunnels and related structures*







MAN'S SKILL PUT TO USE

The damming of the South Saskatchewan River, an undertaking of such magnitude that eight years were required for the project, is the realization of men of vision who for more than a century have advocated the harnessing of the waters of this great river.

Years of investigation and intensive engineering studies have gone into building this great endeavor. In the planning and design an extraordinary amount of basic information was required.

In this respect, PFRA was fortunate in that it had personnel with many years of experience in the development of such large structures as the St. Mary, Waterton and Travers dams in Alberta. As well, wide experience had been gained in the construction of hundreds of smaller water conservation projects built by PFRA across the four western provinces.

PFRA, a branch of the Canada Department of Agriculture at the time that the project was constructed and now of the Department of Regional Economic Expansion, has its headquarters in Regina. The resources of all technical disciplines of the PFRA Engineering Service were utilized in the design and construction of the project. These include the following Technical Divisions: Design, Geology and Air Surveys, Hydrology and Surveys, and the Saskatoon based Soil Mechanics and Materials Division.

The PFRA Land Section was responsible for the acquisition of approximately 150,000 acres of land in the reservoir area. The cost of this land was about $2.9 million.

Skilled experiments and tests have ensured successful and efficient results.

In accomplishing this engineering feat, the construction industry has demonstrated its mastery over the physical obstacles of nature. Contractors, superintendents and workmen, with their machines, have proven their ability to meet this challenge for the benefit of mankind.

That men planning and working together have been able to bring this enormously complex project to fruition, should be a source of pride not only to the residents of Saskatchewan but to Canadians everywhere.

A MIGHTY POWER HARNESSED

Completion of the Gardiner Dam marks the end of the construction phase of the multi-million dollar South Saskatchewan River Project. However, man's conquest of this mighty resource must lead to its utilization.

from dryland farming to irrigation

Studies of the irrigation potential of this project were begun in 1959 by the Saskatchewan Department of Agriculture. In conjunction with the Saskatchewan Soil Survey and the Canada Department of Agriculture, detailed examinations were made of both surface and sub-surface soils, and of the topography in the potential irrigable areas.

The soil survey covered 2.5 million acres. The topography surveys extended over 600,000 acres. By the end of 1962, information had been brought together to delineate the area and to establish the acreage considered as potentially suitable for irrigation.

Three main blocks of land, comprising some 200,000 acres in all, have been identified as suitable for irrigation. It is possible that with improvements in irrigation technology, considerable additional acreage may be added to this total in the future.

Water, pumped from the reservoir into high-level main canals, flows by gravity through smaller distribution canals to the farm turnouts and farm lands.

The initial area being developed for irrigation contains about 42,000 acres of land on the east side of the river downstream from Gardiner Dam. Expected future development involves large acreages on the west side of the river between Outlook and Saskatoon.

The transition from dryland farming to irrigation will not take place immediately. While some farms will convert rapidly, others will increase their irrigable acreage by stages until the changeover is complete.

Initially, coarse grains and forage crops for livestock are expected to predominate. More specialized crops will come later depending largely upon markets.

power production

Project power development will utilize three of the five diversion tunnels at the Gardiner Dam giving an installed plant capacity of 187,500 kilowatts.

Construction of the powerhouse by the Saskatchewan Power Corporation commenced in 1966, and was completed in 1969. The first power from the generators was produced in 1968. In an average year, 800 million kilowatt hours of electricity will be available. This represents 22 per cent of the total power produced by SPC facilities in 1969.

Control of the river will greatly improve the economics of developing hydro sites downstream from the main dam. The reservoir will store the peak summer flows of the river for release to downstream hydro stations during the winter, when natural flows are low and demand for power is high. Other downstream dam sites are now under study which, if developed, would utilize the entire head or drop in the river. This plan would produce a chain of reservoirs, each extending back to the foot of the next dam upstream.

recreation benefits

Recreation on a man-made lake, 140 miles long and with a shoreline of nearly 500 miles, is available in an area of the Province where the majority of the population is concentrated, and where major recreational facilities have been at a premium.

A development of provincial parks, regional parks, institutional camp sites, boating and general recreational facilities is proceeding at a rapid pace. This new recreation resource is within easy reach of half of the population of the Province.

the qu'appelle diversion

Water diverted from the South Saskatchewan Basin to the Qu'Appelle Basin will be vitally important to the future development of the populous southeastern part of the Province.

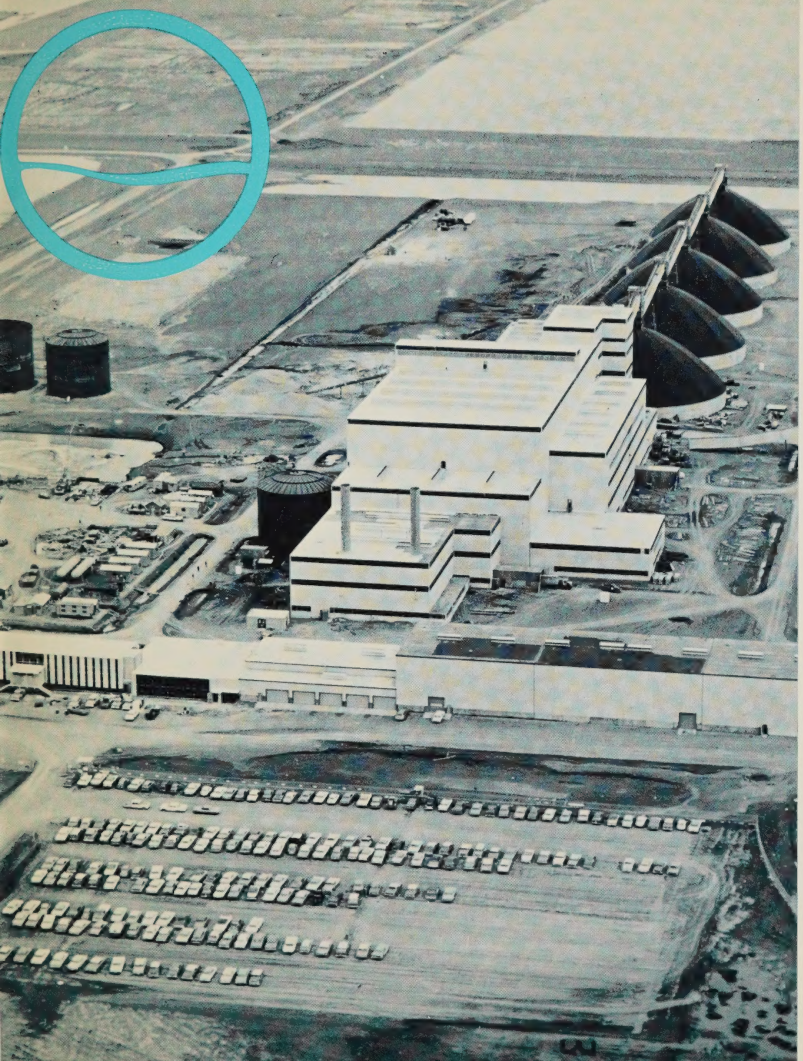
This supply of water in adequate quantities is encouraging the further development of irrigation and of resource-based industry such as potash. As basic industries multiply, so secondary and service industries will increase.

To the water-short cities of Regina and Moose Jaw, water diverted into the Qu'Appelle Valley and thence to Buffalo Pound Lake provides an assured supply.

The Qu'Appelle chain of lakes and Last Mountain Lake together form the nucleus of an important Saskatchewan recreation area. These lakes are being improved by clear water diverted from the reservoir to freshen them and to stabilize their levels.

water distribution to more distant parts

The Saskatoon Southeast Water Supply System is an important concept for the distribution of water for industry, agriculture and people. This system was developed by the Saskatchewan Water Supply Board, and consists of a network of canals, pipelines and reservoirs which delivers water from Diefenbaker Lake to towns and industries southeast of the City of Saskatoon.



New industry will take advantage of hydro power and water from the Gardiner Dam — Shown is a modern potash plant.

Planners envisage water from Diefenbaker Lake being moved east through the Qu'Appelle system and into Manitoba, and south through the Souris River system to the Estevan area. From this will be developed water distribution networks patterned after the Saskatoon Southeast Water Supply System.

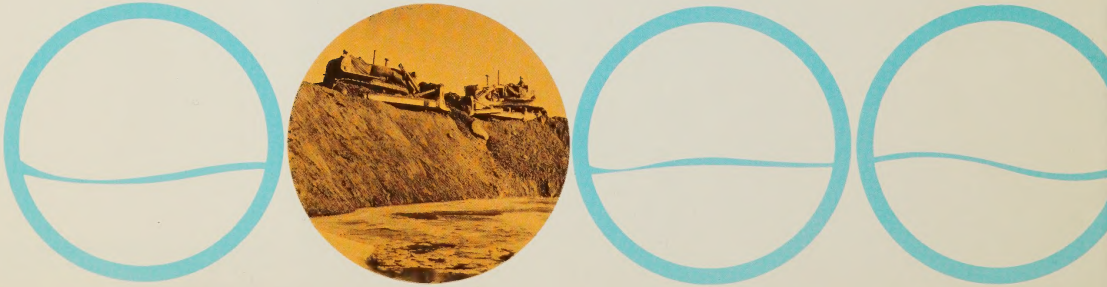
The South Saskatchewan reservoir will thus be an immensely valuable addition to the resources of the province and the nation.

what of the future?

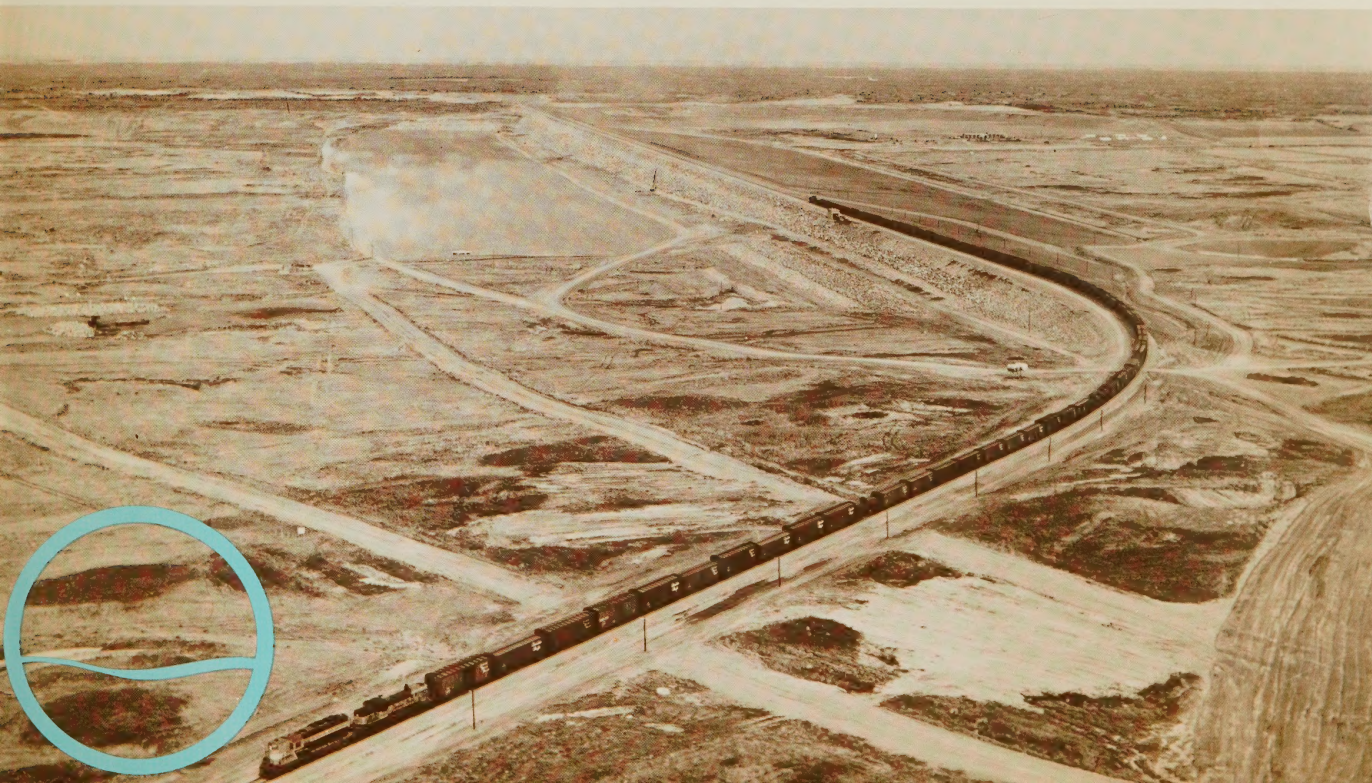
Water and power from the South Saskatchewan River Project will continue to serve man's needs and will ensure a firm base for the growth of southern Saskatchewan, rich in agricultural and mineral resources. This era of increasing agricultural production, industrialization and growing population can only be sustained if the basic resource—water—can be provided at the place and at the time it is needed.

It is now evident that the available flows in the Saskatchewan system will be insufficient to meet the needs of the three Prairie Provinces. Already there are concerns that the existing water supplies of the Saskatchewan system may be overtaxed before the turn of the century by provincial demands. Additional water may have to be brought in from adjacent river basins to meet these requirements.

With this event, Diefenbaker Lake will play a vital role as a key river-control structure and hub of a major water supply and distribution system.



Prairie commerce rumbles over the Qu'Appelle Dam.



THE GARDINER DAM AND AREA